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PENSOFT

First record of the driftwood catfish *Spinipterus acsi* Akama & Ferraris, 2011 (Siluriformes, Auchenipteridae) for Brazil, Juruá River, Amazon basin

Bárbara B. Calegari,[1, 2] Alberto Akama,[3] Roberto E. Reis[1]

1 Laboratório de Sistemática de Vertebrados, Pontifícia Universidade Católica do Rio Grande do Sul. Av. Ipiranga 6681, 90619-900 Porto Alegre, RS, Brazil; barbara.calegari@gmail.com, reis@pucrs.br. **2** Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC, 20560 USA. **3** Museu Paraense Emílio Goeldi, Setor de Ictiologia, Caixa Postal 399, 66040-170 Belém, PA, Brazil; aakama@gmail.com

Corresponding author: Bárbara B. Calegari, barbara.calegari@gmail.com

Abstract

Spinipterus Akama & Ferraris, 2011 is a monotypic genus known only by the holotype of its single species *S. acsi*, described from a creek tributary to the Nanay River, in the Peruvian portion of the Amazon basin. A second specimen of this genus and species representing the first record of occurrence in Brazil is reported from the Juruá River, upper Amazon basin, Amazonas state.

Key words

Taxonomy; Ostariophysi; biodiversity; Neotropics.

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Introduction

Spinipterus Akama & Ferraris, 2011 is a monotypic genus of Auchenipteridae, an inseminating family of Siluriformes known as driftwood catfishes. The auchenipterids represent a monophyletic family recognized by several features related to sexual dimorphism, such as the possession of an intromittent organ in mature males and modifications on the fins and maxillary barbel during reproductive season (Ferraris and Vari 1999, Birindelli 2014, Calegari et al. 2014). The family currently comprises 120 species arranged in 22 genera (Eschmeyer et al. 2018, updated), *Spinipterus* being the most recently described. This genus was described based solely on the holotype from a creek tributary to the Nanay River in Peru. Some members of the Auchenipteridae are difficult to collect due to their behavior of lurking inside crevices in dead submerged logs, which require specific efforts beyond the traditional methods to collect them. Consequently, some species of Auchenipteridae, mainly centromochlines, are poorly represented in fish collections. Recently, a specimen of *Spinipterus acsi* Akama & Ferraris, 2011 was discovered and identified in a museum fish collection, which was collected in the Juruá River, upper Amazon basin. So far, this specimen represents the second known individual of this species and the first record for Brazil.

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Figure 1. *Spinipterus acsi*, UFRGS 21671, male, 37.1 mm SL, Juruá River, upper Amazon basin, Brazil.

Methods

The specimen of *Spinipterus acsi* (Fig. 1) is deposited in the fish collection of the Universidade Federal do Rio Grande do Sul, Porto Alegre (UFRGS), Brazil. Measurements were made point-to-point and recorded to 0.1 mm, following Lundberg and McDade (1986), with modifications introduced by Akama and Ferraris (2011). Morphometric data are expressed as percent of the standard length (SL), except subunits of the head, which

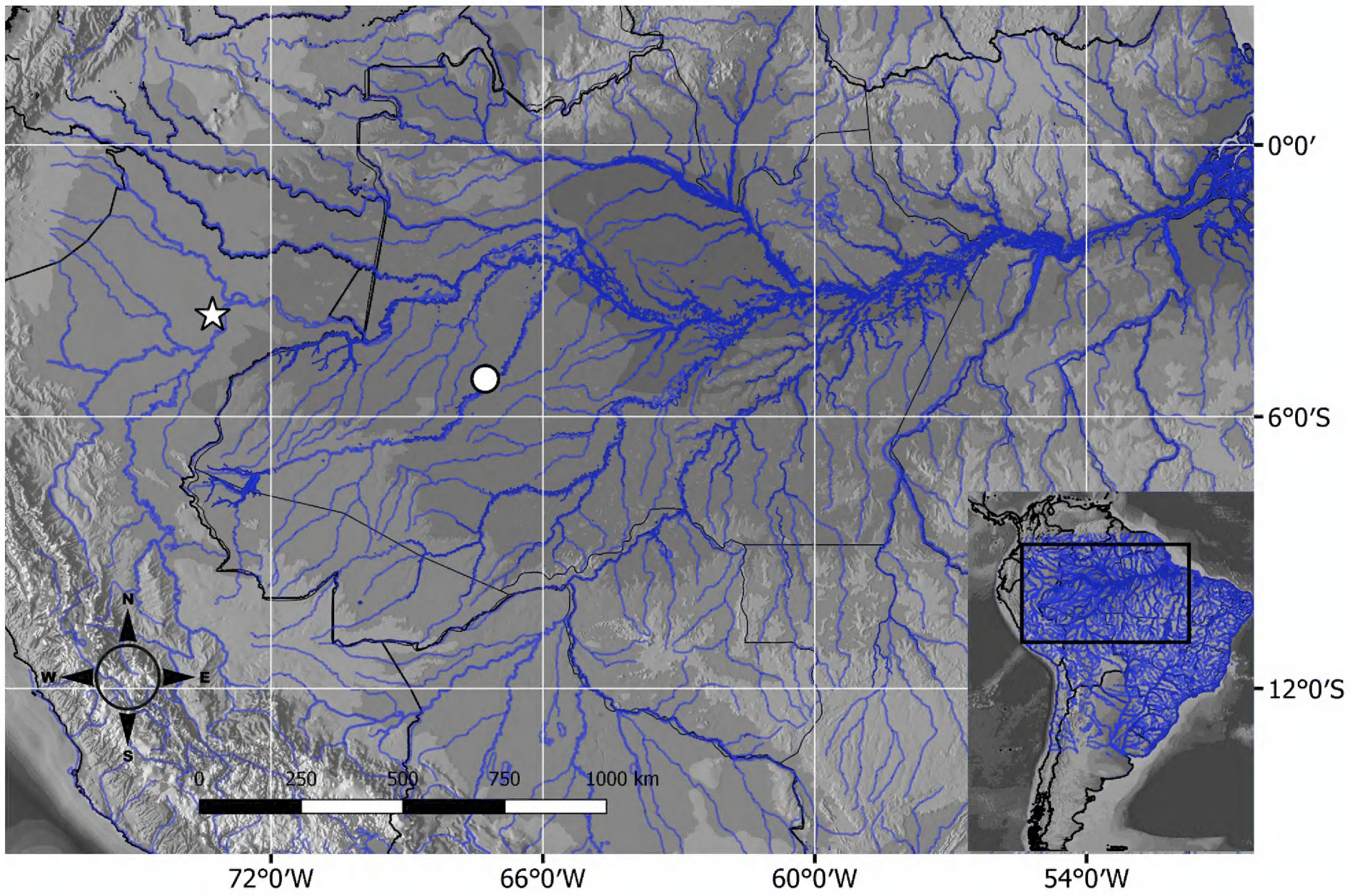

Figure 2. Type locality of *Spinipterus acsi* (ANSP 178209) in the Nanay river basin, upper Amazon, Peru (star) and the new specimen (UFRGS 21671) from the Cachimbo creek, tributary to Bauana Branco, Juruá River, upper Amazon basin, Carauari, Amazonas, Brazil (dot).

are expressed in percent of head length (HL). The geographic distribution map was prepared using the software Quantum GIS v. 2.14.5 following Calegari et al. (2016). Total genomic DNA was isolated through the DNeasy Blood & Tissues Kit (QIAGEN®, Hilden, Germany). The mitochondrial gene 16S and the nuclear SH3PX3 were amplified with the primers 16SAR and 16SBR (Palumbi et al. 1991), and SH3PX3-F461 and SH3PX3-R1303 for first step of the nested PCR, and SH3PX3-F532 and SH3PX3-R1299 for the second PCR (Li et al. 2007). The polymerase chain reaction (PCR) was performed in 25 µl of 10 µM of each primer, 1× Master Mix Kit (QIAGEN®, Hilden, Germany), and ca 40 ng of DNA. The amplicon was purified and sequenced in both directions at Funcional Bioscience®, Inc. facility (WI, USA). The consensus sequences were edited and generated through program Geneious® 6.0.5 (http://www.geneious.com) for deposition in GenBank.

Results

New record. *Spinipterus acsi*, UFRGS 21671, 1 specimen (also tissue sample preserved), male, 37.1 mm SL, Cachimbo Creek, tributary to Bauana Branco, Juruá River, upper Amazon basin, Carauari, Amazonas, Brazil, 05°09′57″ S, 067°16′20″ W (Fig. 2), Vinicius A. Bertaco, Tiago P. Carvalho and Nilton Leite, 16 June 2008.

Identification. *Spinipterus acsi* was described and distinguished from all members of Auchenipteridae based on the following diagnostic characters (Akama and Ferraris 2011): pectoral-fin spine with 4 rows of serrations (Fig. 3); lateral margin of skull roofing bones ornamented with a single row of spines; groove along dorsal midline posterior to dorsal fin, which accommodates the entire dorsal-fin spine and fin rays. The new specimen here recorded from the Juruá river basin shares all aforementioned distinctive features and is identified as *Spinipterus acsi* by both external morphological features and color pattern.

Spinipterus acsi, UFRGS 21671 (tissue 6598), non-type vouchered specimen, genseq-4 *SH3PX3,* GenBank Accession Number: MF595442; and genseq-4 16S, GenBank Accession Number: MF595171.

Remarks. The specimen collected in the Juruá River was compared to the holotype of *Spinipterus acsi* (ANSP 178209). The comparative morphological analysis revealed that the holotype of *S. acsi* has 3 rows of serration along anterior and anterolateral margins of the dorsal-fin spine instead of 4 rows as previously reported by Akama and Ferraris (2011) (Fig. 4), which also represents a diagnostic feature of *Spinipterus* within Auchenipteridae and is shared by the newly discovered specimen. Morphometric data for the holotype and the newly discovered specimen of *S. acsi* are shown in Table 1.

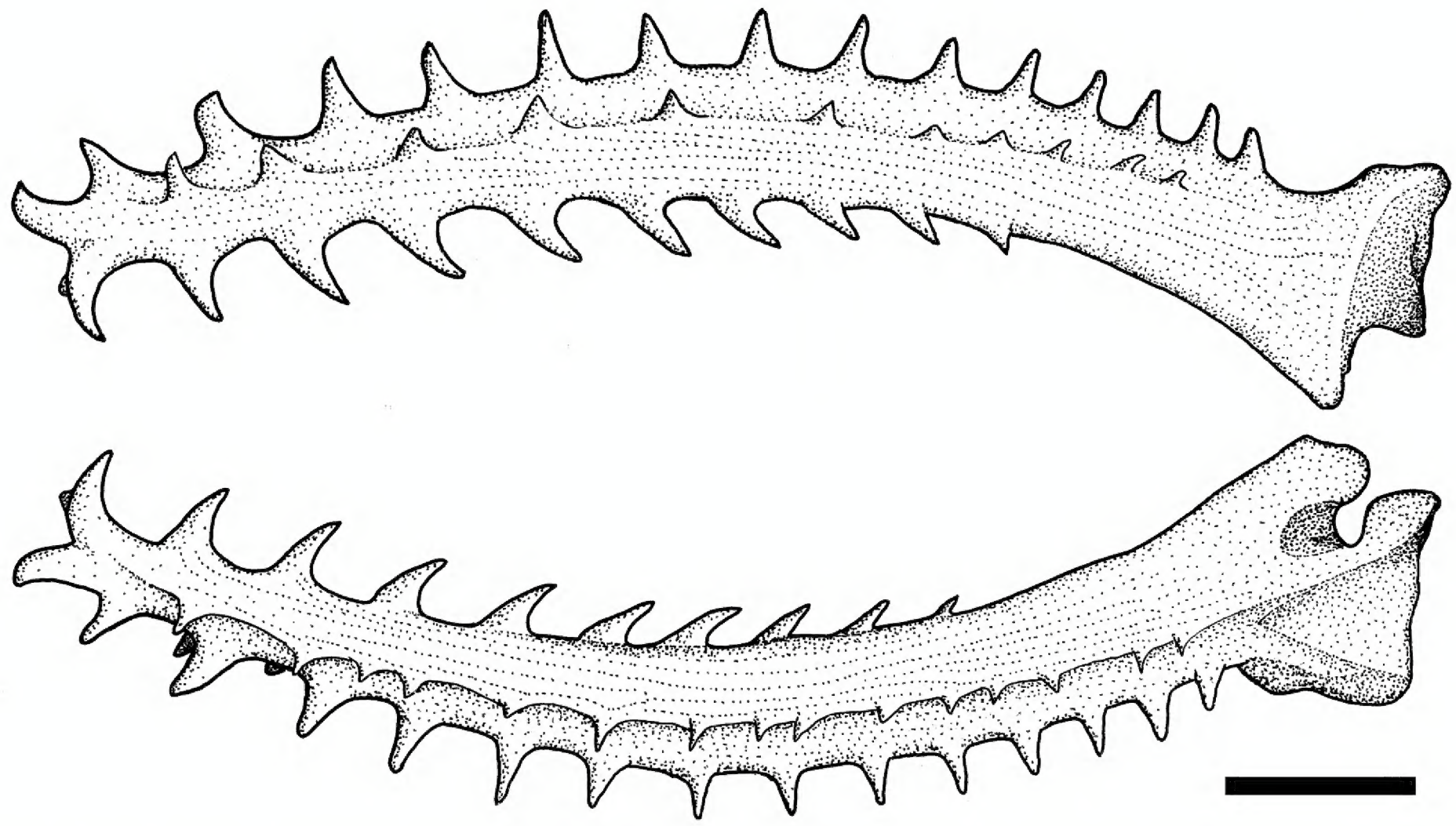

Figure 3. Dorsal (above) and ventral (below) views of the right pectoral-fin spine of *Spinipterus acsi*, holotype, ANSP 178209, based on high resolution x-ray computed tomography (CT scan) showing 4 rows of spines. Scale bar = 1mm.

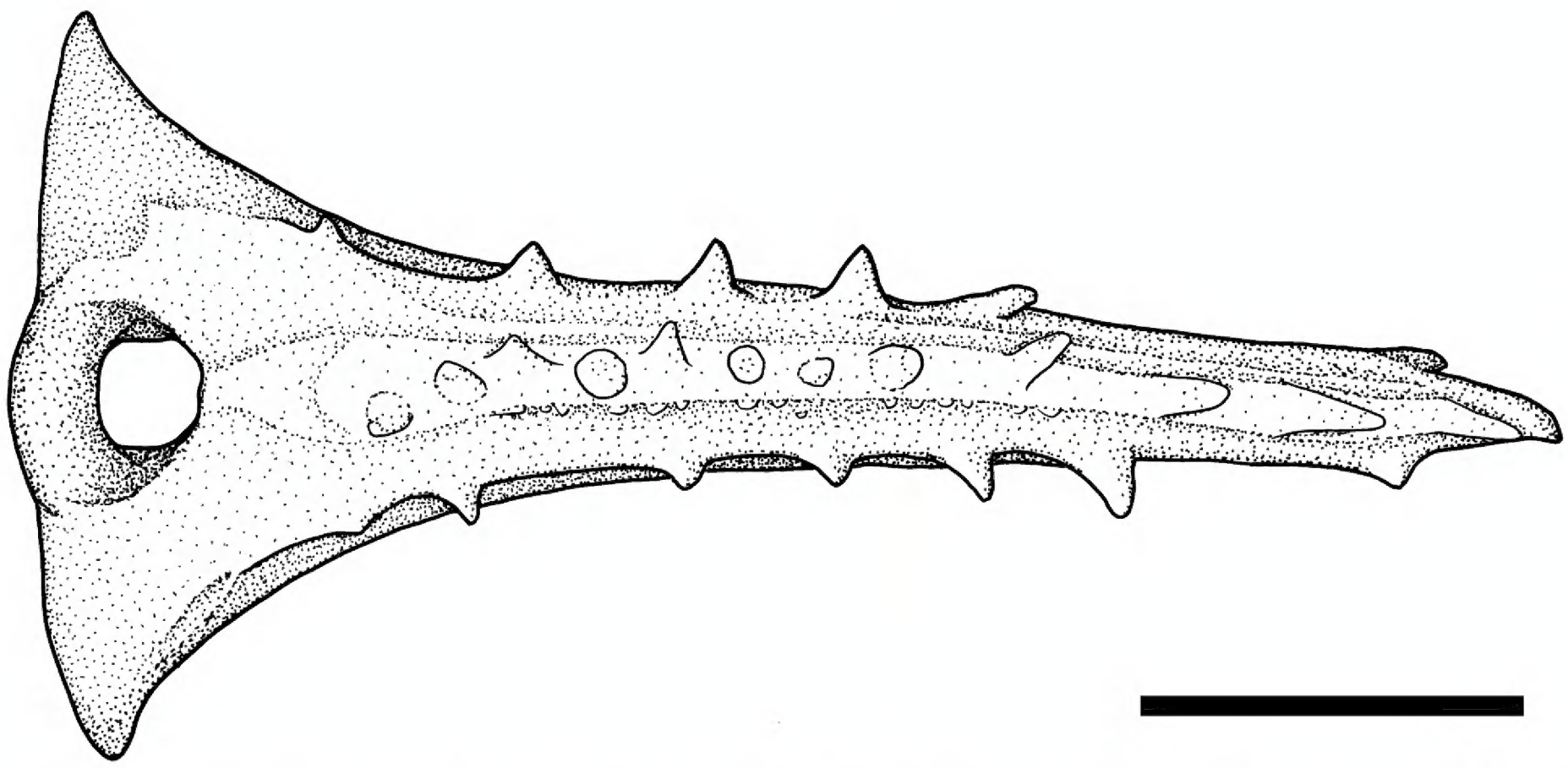

Figure 4. Dorsal view of the dorsal-fin spine of *Spinipterus acsi*, holotype, ANSP 178209, based on high resolution x-ray computed tomography (CT scan) showing 3 rows of spines. Scale bar = 1 mm.

Discussion

Spinipterus acsi is easily recognizable by its body shape, especially by the dorsal- and pectoral-fin serrations, and by a row of well-developed spines along the lateral margins of the dorsal surface of the head. Thus, confusion with remaining species of Auchenipteridae is unlikely. When describing the new and unusual spiny auchenipterid *Spinipterus*, Akama and Ferraris (2011) had already drawn attention to how the biodiversity of small creeks and headwaters of the Amazon basin is poorly known, even in some relatively well explored areas. The discovery of a second specimen of *Spinipterus acsi* in a distinct drainage of the Amazon basin, representing the first record for Brazil, along with the known existence of three additional undescribed species, reinforce the assertion about the poor knowledge of biodiversity of fishes, particularly auchenipterids due to the difficulty in accessing their microhabitat.

The extinction risk of *Spinipterus acsi* has not been assessed for the IUCN Red List or the Brazilian Ministry of Environment (MMA/ICMBio). This new record extends its geographic distribution to a distance of about 1,900 km by river from the type locality (Fig. 2). Although

this species seems to be naturally rare, additional collecting efforts should be conducted in order to reveal a more realistic geographic distribution before its extinction risk can be properly assessed.

Table 1. Morphometric data of *Spinipterus acsi* from the Juruá River, Brazil (UFRGS 21671), and the comparative data of the holotype (ANSP 178209) transcribed from Akama and Ferraris (2011).

Measurements	Juruá specimen	Holotype
Standard length (mm)	**37.1**	**32**
Percent of standard length		
Predorsal length	34.8	33.1
Prepectoral length	24.2	23.4
Head length	25.2	24.6
Body depth	20.9	22.8
Body width	28.2	28.1
Upper gill membrane distance	23.6	22.6
Dorsal-fin base length	11.1	12.8
Dorsal-fin spine length	13.5	12.5
Cleithral process length	20.8	24
Pectoral-fin spine length	23.0	23.4
Anal-fin base	20.7	20.2
Caudal peduncle length	14.2	14.7
Caudal peduncle depth	12.5	12.1
Percent of head length		
Mouth width at rictus	59.5	67.4
Snout length	31.6	36
Eye diameter horizontal	18.9	19.8
Bony interorbital	56.9	58.9
Internarial length	21	17.8

Acknowledgements

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Authors' Contributions

BBC and AA examined and identified the specimen; BBC prepared the map, Figure 1, and took measurements; RR calculated geographical distance between localities along the river and prepared the schematic Figures 3 and 4. All authors wrote, revised, finalized, and approved the manuscript.

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